Testimony Before the Energy Subcommittee
House Science Committee
U.S. House of Representatives

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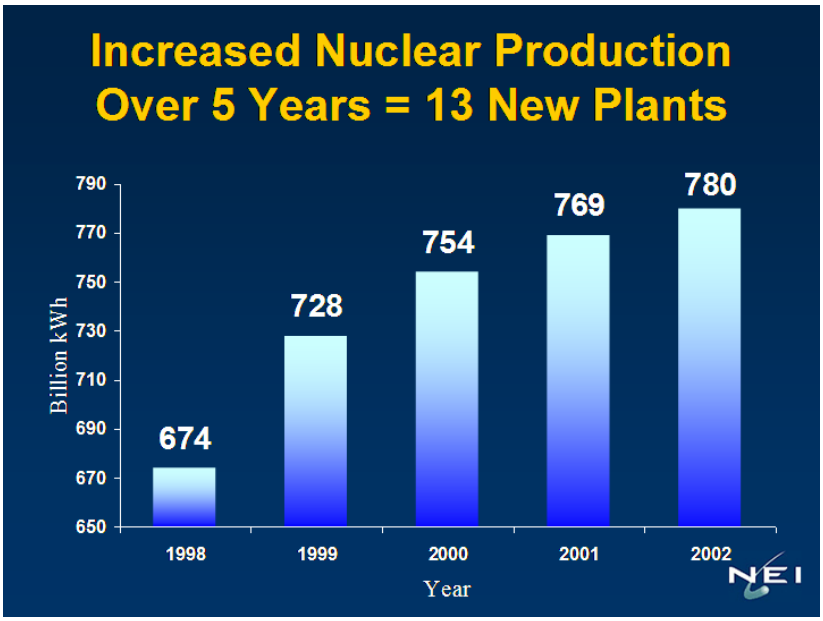
Chairman Biggert, Ranking Member Lampson and distinguished members of the subcommittee, I am Angie Howard, executive vice president of the Nuclear Energy Institute (NEI). NEI is the Washington, D.C.-based policy organization for the nuclear energy industry.

NEI's 270 corporate and other members are engaged in the beneficial use of nuclear technologies. They represent a broad spectrum of interests, including every U.S. energy company that operates a nuclear power plant. NEI's membership also includes nuclear fuel cycle companies, suppliers, engineering and consulting firms, national research laboratories, manufacturers of radiopharmaceuticals, labor unions, law firms and 57 universities.

America's 103 nuclear power plants are the safest, most efficient and reliable in the world. Nuclear energy is the largest source of emission-free electricity generation in the United States. Nuclear power plants in 31 states provide electricity for one of every five homes and businesses in the nation, and the industry again last year reached record levels for efficiency and electricity production.

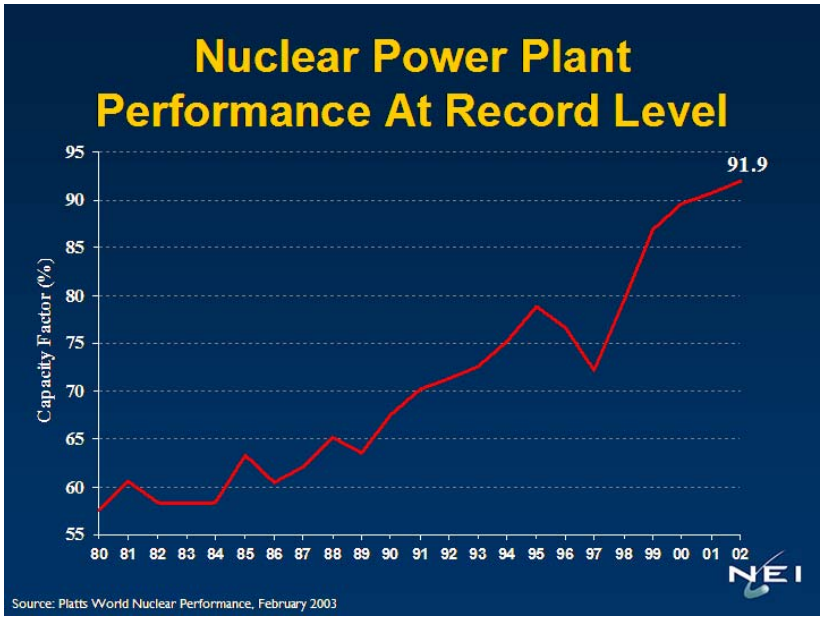


The first illustration shows how much more electricity has been produced by our nuclear plants over the past five years through greater efficiency—increased electricity output from our existing nuclear reactors. From 1998 to 2002, the increases in efficiency were equivalent to adding 13 1,000-megawatt power plants to our nation's electricity grid.

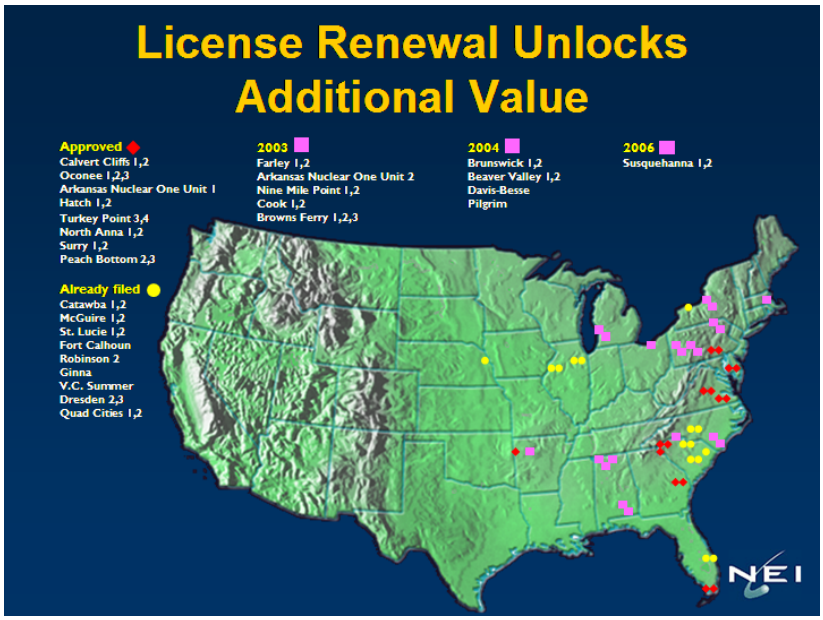
Last year's record performance capped the best decade in the industry's history. Even with growth in overall energy demand and production, America's nuclear power plants have kept pace and, as our nation's second largest source of electricity, continue to provide approximately 20 percent of the nation's electricity.

The growth in nuclear power production avoided the environmental disruptions and impacts that would have occurred if new electric generation had to be

brought on line to meet our country's electricity needs. The lack of new nuclear construction since the 1980s often is identified as a sign of industry stagnation, when in fact, expanded operation of existing facilities has actually been the environmentally preferable alternative for making additional electricity.



As you can see from my next illustration, nuclear power plant capacity increases and operating efficiencies continue. Plant uprates, improved maintenance and reduced outage times will contribute to even higher operating efficiency and additional electricity output from existing power plants. But these increases are finite, limited to the maximum capacity of each reactor. What can we expect from our current operating fleet as far as lifetime service is concerned?



In the 1990s, we began the process of extending the operating licenses of our nuclear reactors for an additional 20 years, to a total of 60 years. Congress selected the original 40-year license period because it was a typical amortization period for an electric power plant. Congress also allowed for license renewal. As this illustration shows, 16 reactors have renewed operating licenses. We expect the vast majority of plants to extend their operating licenses beyond the initial 40-year period. The people who will operate and maintain these plants toward the end of the licenses are not even in the work force yet.

We should expect total electric output from nuclear plants to continue to increase along with increases in productivity and additional plant uprates. But to meet future demands of an electricity-hungry digital economy, especially

when environmental requirements limit some options, several electric companies are beginning to examine the market for new nuclear power plants. Demand for electricity is expected to grow by 40 percent by 2020, according to the Department of Energy. In order to maintain at least one-third of our total electricity production from emission-free sources, the industry has set an ambitious goal for the future: building 50,000 megawatts of new nuclear energy production by 2020, and gaining another 10,000 megawatts of capacity by making today's plants even more efficient.

Already, the industry is working in a private-public partnership with the Department of Energy. DOE's Nuclear Power 2010 initiative has as its goal to help the first of those new nuclear plants begin operation by the end of this decade. But it is essential that Congress adopt policies that foster the further development of this vital part of our nation's energy mix—including support to the vital training and research infrastructure of the sector.

My testimony today will address three key points:

1. The nuclear industry is facing a looming staffing crisis

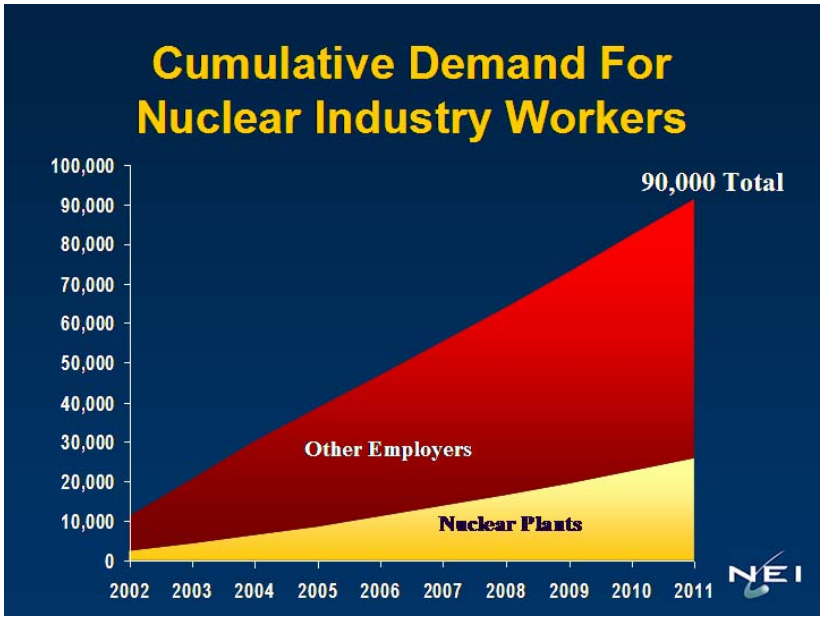
2. Federally funded university programs are critical to meeting staffing needs in several critical areas, including nuclear engineering, health physics and various engineering disciplines.

3. Federal support for skilled craft and technician training also is key to meeting the need for the highly qualified work force our industry needs to continue its high levels of efficiency and electricity production.

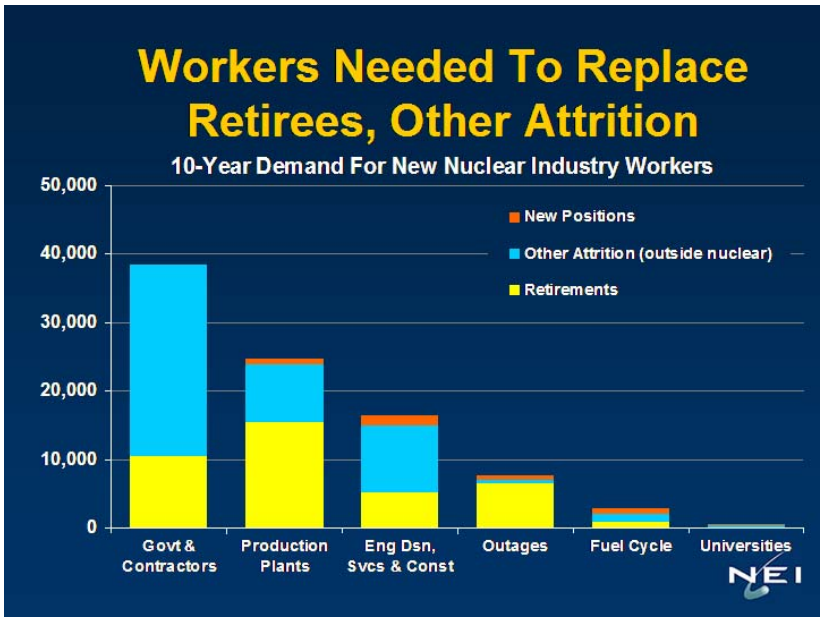
Without question, nuclear energy in the United States is experiencing a renaissance. We see clear signs that this renaissance is gaining new recognition in Congress—through bipartisan legislation introduced this year in the House and Senate, by the administration in its national energy policy and among the American public. The renaissance is driven by the overwhelming need to maintain our diverse mix of energy generation and to meet the ambitious energy and environmental requirements of the future.

The industry is entering a new phase—one of developing new plants incorporating new, advanced reactor technologies that could be used uniformly across the nation to meet increasing electricity demand. As we enter this dynamic new era, it is critical that we do so on the safe foundation that only a strong federal research and development base can provide.

Looming Workforce Crisis



Last year, NEI conducted a major study on the staffing needs of the nuclear industry, which includes plant operations, plant outages, government personnel and government contractors, front- and back-end fuel cycle, engineering design, services and construction, and universities. Although the study did not take into account the possibility for new plant construction and operation, it indicates a need for 90,000 new workers in our industry from 2002 to 2011.



A more recent study of staffing for the nuclear power sector alone indicates that many plants are facing significant attrition in such areas as maintenance, engineering, operations, safety and radiation protection. Most of the attrition in the nuclear power sector will be due to retirement. We expect to see the first wave of retirements in the next three to five years, but a far more significant number of retirements seven to 10 years from now.

Data show that the need for nuclear engineers and health physicists will outstrip supply.

A recent study conducted by the Health Physics Society[1] concluded that a critical shortage exists in the supply of qualified radiation protection professionals throughout a broad spectrum of activities, including nuclear

[1] "Human Capital Crisis in Radiation Safety; Position Statement of the Health Physics Society," August 2001.

power production. The society also concluded that the current imbalance between supply and demand will significantly worsen in the near-term after which it will become completely untenable. The present demand for radiation protection professionals is approximately 130 percent of supply, and over the next five years demand will outstrip supply by 160 percent. The Nuclear Energy Institute study[2] concluded that the demand will be 210 percent of supply in 10 years.

A shortage of radiation protection professionals has also been identified as a major strategic issue by the Institute of Nuclear Power Operations (INPO)[3] and several power producers.

Another area where we project a critical shortage is in nuclear engineering. According to NEI's study, demand for nuclear engineers will be about 150 percent of supply over the next 10 years.

To give you some figures, DOE reports that the number of nuclear engineering bachelor of science enrollments declined from 1,400 in 1993 to about 500 in 1998. Oak Ridge Institute for Science and Education found that total U.S. undergraduate nuclear engineering degrees decreased by 20 percent in 2000 and masters by 6 percent. [4] Although some universities are seeing a

[2] "Nuclear Pipeline Analysis," Nuclear Energy Institute. December 2001.
[3] "A Strategic Look at the Future of Radiological Protection"; Proceedings of the 2001 Radiation Protection Manager's Workshop", Institute of Nuclear Power Operations. September, 2001.
[4] "Nuclear Pipeline Analysis," Nuclear Energy Institute. December 2001.

stabilization or slight upturn in nuclear engineering enrollments, we still must address this shortfall.

The Government Accounting Office (GAO) has prepared a series of reports analyzing the looming crisis in human capital and its effects on key government agencies, designating the issue of human capital as a governmentwide high-risk area[5]. In a report on the issues facing the Department of Energy[6], the GAO concluded that the shortage of technical staff at DOE will reach crisis proportions within the next 10 years.

In a report on the issues facing the Nuclear Regulatory Commission,[7] the GAO concluded that 33 percent of the technical professionals will be eligible for retirement by the end of 2005. In a further analysis of the NRC's human capital issues, the GAO also concluded that the NRC's ability to maintain the skills needed to achieve its mission is threatened by the decline in university enrollments in nuclear engineering and other fields related to nuclear safety.[8] In response to this, the NRC has already initiated an aggressive recruiting campaign and has instituted a practice of hiring non-nuclear-educated personnel and providing customized training programs in nuclear technology.

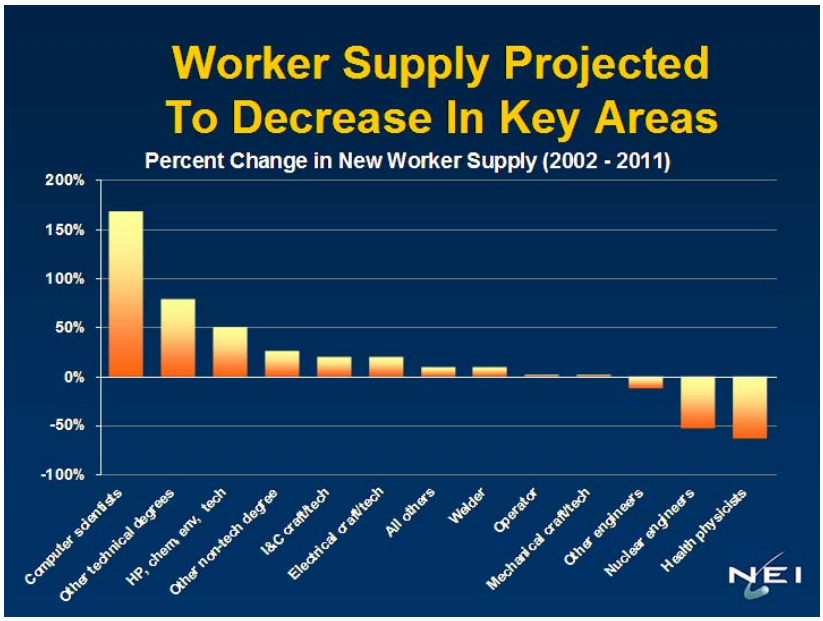
[5] GAO-01-357T, "Human Capital: Meeting the Governmentwide High-Risk Challenge," Statement of David M. Walker, Comptroller General of the United States, in testimony before the U. S. Senate. February 1, 2001.
[6] GAO-01-246, "Major Management Challenges and Performance Risks: Department of Energy," Government Accounting Office. January, 2001.
[7] GAO-01-259, "Major Management Challenges and Performance Risks; Nuclear Regulatory Commission," Government Accounting Office. January, 2001.
[8] GAO-01-241, "Major Management Challenges and Performance Risks; A Governmentwide Perspective," Government Accounting Office. January, 2001.

This is a laudable stop-gap measure, but it will not resolve the problem over the long term.

With the advent of advanced medical techniques, competition between the medical community and nuclear industry for nuclear engineers and health physics degreed personnel has also increased. The government—including the Department of Homeland Security—also will be competing for this same labor pool.

Need for DOE University Programs

As our industry matures, so does our workforce. Our dramatic improvements in productivity and efficiency are due in large part to our highly skilled and excellently trained employees.



This training comes primarily from two sources: Universities and accredited industry training (through INPO). With the looming waves of retirement throughout the nuclear technologies sector, it will be vital that the new employees coming into the industry are highly skilled upon entrance and the best and brightest our nation has to offer. For example, new nuclear engineers will be needed to replace retiring staff in the commercial sector, as well as faculty members at leading educational institutions.

Unfortunately, the pipeline for key areas of nuclear technologies will continue to go unfilled in this decade as identified in this illustration.

With nuclear plant relicensing and plans for new plants, demand for highly educated and trained professionals will continue. The only program that provides federal government support for educating and training our nuclear

energy science, technology and engineering knowledge base is DOE's University Support Program. This program supports vital research and educational programs in nuclear science at the nation's colleges and universities.

The number of four-year programs across our nation to train future nuclear scientists has declined to approximately 25—a 50 percent reduction since about 1970. Current state budget shortfalls are exacerbating the closure rate. Universities across the United States cannot afford to maintain their small research reactors, forcing their closure at an alarming rate. This year there are only 28 operating research and training reactors, more than a 50 percent decline since 1980. Two-thirds of the nuclear science and engineering faculty are over age 45, with little ability to draw new and young talent to replace them.

NEI recommends $26.5 million for DOE's University Support Program for fiscal year 2004 to stop the disintegration of this valuable infrastructure. To maintain our nation's position as the international leader in nuclear technology, it is vital that the trends mentioned here be reversed and that our nation's best and brightest technical minds be attracted to the nuclear technologies. We support H.R. 6, which includes Chairman Biggert's legislation, H.R. 2126. This legislation will fully fund university programs by increasing funding for student recruitment, teaching facilities, fuel and other reactor equipment, and instructors to educate a new generation of American

nuclear specialists. We hope to see these provisions in final legislation that passes both houses of Congress.

NEI encourages the committee to consider a new $2 million program within the Office of Nuclear Energy to support universities that have undergraduate and graduate programs in health physics. The industry's most recent survey of human resources revealed that health physics professionals are declining in numbers and the need will become acute in the next few years, when many will retire. This critical resource will be necessary to support the industry, government programs at DOE sites and national laboratories, NRC activities and homeland security programs.

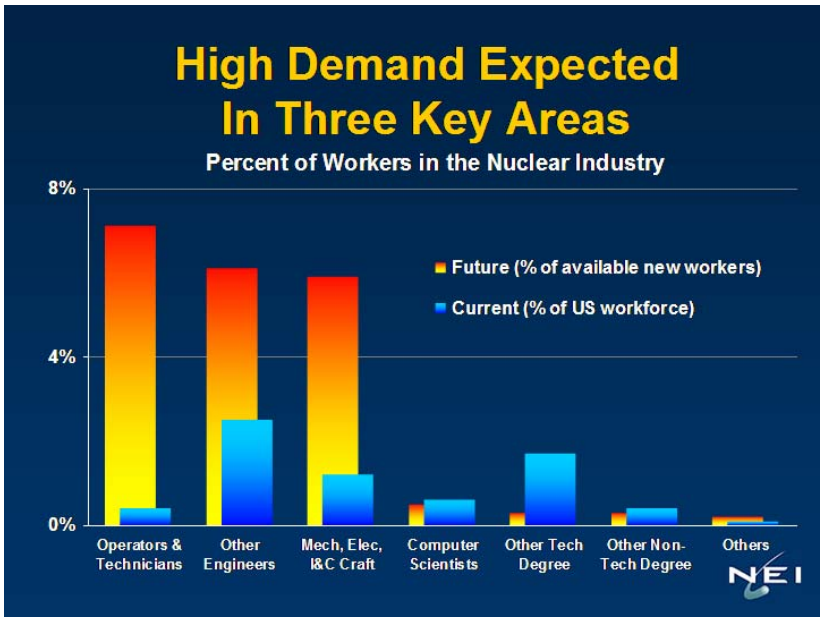
For more than 20 years, the industry has had a program to support higher education.

To foster the training of engineers, the nuclear industry funds several educational assistance programs through the National Academy for Nuclear Training. The National Academy Educational Assistance Program supports U.S. nuclear engineering education, encourages students to consider careers in the nuclear energy industry, and supports students who would be likely candidates for employment in the industry after graduation. Each year, the program awards $560,000 in graduate fellowships and $375,000 in

undergraduate scholarships. Since 1980, the industry has provided more than $19 million to support some 3,400 students.

Need for Skilled Craft and Technician Training Programs

One area that is not currently supported by the federal government to any great degree is technical and skilled craft training programs. The industry supports the implementation of such a program within the context of the energy bill now being considered in the Senate. The bill sets aside $20 million each year through fiscal year 2008 to train skilled technical personnel. This funding will supplement the aggressive work force programs conducted by organized labor and the industry.



As you can see from this illustration, the need for this type of personnel is the third most vital for the industry. The legislation does the nation a great service by recognizing and addressing vital personnel and training needs for the energy sector. In so doing, Congress is cultivating the vital talent and skill needed to power our homes, our cities, our economy and our future.

I commend the Science Committee for its foresight in addressing secondary school technical education last year. It is important to foster science and math education for young children, because they ultimately will fill college classrooms in technical fields. In particular, I want to thank Rep. Ehlers for working to secure appropriations for the National Science Foundation. The law that was passed, public law 107-368, includes many exciting provisions that support science and math education. And although the focus in the past has been on advanced education, Section 9 authorizes grants to institutions of higher learning, or eligible nonprofit organizations, to establish math and science education partnership programs to improve secondary school instruction. It also emphasizes training master teachers and encouraging girls to pursue studies in science, math, engineering and technology. This is exciting and far-sighted legislation that further supports America's need for technically trained professionals.

In conclusion:

1. The nuclear industry is facing a looming staffing crisis.

2. Federally funded university programs are critical to meeting staffing needs in several critical areas, including nuclear engineering, health physics and other engineering disciplines.

3. Federal support for skilled craft and technician training is key to meeting the need for the highly qualified work force our industry needs to continue its high levels of efficiency and electricity production.

There are critical steps to be taken in cultivating the next generation of nuclear professionals to advance the use of proven and vital nuclear technologies, including nuclear power plants. These plants are and will continue to be a vital part of our nation's energy mix—and the only large source of emission-free electricity that is readily expandable. I ask for your continued support in the effort to ensure an adequate supply of highly qualified technical professionals for nuclear energy and other beneficial uses of nuclear technologies. Thank you.